

Docket No.: 07206-118001  
Client Ref. No.: 99E142

## CLAIMS

- 1        1. A method of making aluminum oxynitride, the method comprising:  
2                introducing aluminum oxide particles into a chamber;  
3                dispersing the particles within the chamber; and  
4                forming the aluminum oxynitride comprising passing nitrogen gas over the dispersed  
5                particles.
  
- 1        2. The method of claim 1, wherein forming the aluminum oxynitride comprises  
2                heating the particles.
  
- 1        3. The method of claim 1, further comprising introducing carbon into the chamber to  
2                form a mixture comprising aluminum oxide and carbon.
  
- 1        4. The method of claim 1, further comprising introducing a reducing agent into the  
2                chamber to form a mixture comprising aluminum oxide and the reducing agent.
  
- 1        5. The method of claim 1 wherein forming the aluminum oxynitride comprises  
2                heating the mixture.
  
- 1        6. A method of making aluminum oxynitride, the method comprising:  
2                introducing a mixture comprising aluminum oxide and carbon into a chamber;  
3                agitating the mixture within the chamber; and  
4                heating the mixture to make aluminum oxynitride.
  
- 1        7. The method of claim 6, further comprising:  
2                introducing nitrogen gas into the chamber.
  
- 1        8. The method of claim 6, wherein agitating the mixture comprises rotating the  
2                chamber.
  
- 1        9. The method of claim 6, further comprising:  
2                cooling the aluminum oxynitride;

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3           removing the aluminum oxynitride from the chamber; and  
4           introducing a second mixture comprising aluminum oxide and carbon into the  
5        chamber.

1           10. The method of claim 6, further comprising:  
2           forming the aluminum oxynitride into a transparent structure.

1           11. The method of claim 10, wherein forming the aluminum oxynitride comprises:  
2           forming a green body comprising the aluminum oxynitride; and  
3           sintering the green body.

1           12. The method of claim 11, further comprising:  
2           isostatically pressing the sintered green body under heat.

1           13. The method of claim 6, wherein the aluminum oxynitride comprises  $Al_{23}O_{27+x}N_{5-x}$ , where  $0.429 \leq x \leq 2$ .

1           14. A method of making aluminum oxynitride, the method comprising:  
2           introducing a first reaction mixture comprising aluminum oxide and carbon into a  
3        chamber;  
4           agitating the first reaction mixture within the chamber;  
5           heating the chamber to a temperature to form aluminum oxynitride from the first  
6        reaction mixture;  
7           removing the aluminum oxynitride while maintaining the temperature of the chamber;  
8        and  
9           introducing a second reaction mixture comprising aluminum oxide and carbon into  
10       the chamber while maintaining the temperature of the chamber.

1           15. The method of claim 14, further comprising:  
2           introducing nitrogen gas into the chamber.

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1        16. The method of claim 14, wherein introducing the first reaction mixture comprises  
2        introducing the first reaction mixture from a hopper.

1        17. The method of claim 14, wherein agitating the first reaction mixture comprises  
2        rotating the chamber.

1        18. The method of claim 14, wherein the chamber comprises an exit opening and  
2        removing the aluminum oxynitride comprises retracting a plunger within the chamber,  
3        thereby allowing the aluminum oxynitride to flow through the exit opening.

1        19. The method of claim 14, further comprising:  
2        forming the aluminum oxynitride into a transparent structure.

1        20. The method of claim 19, wherein forming the aluminum oxynitride comprises:  
2        forming a green body comprising the aluminum oxynitride; and  
3        sintering the green body.

1        21. The method of claim 20, wherein forming the aluminum oxynitride comprises:  
2        isostatically pressing the sintered green body under heat.

1        22. The method of claim 14, wherein the aluminum oxynitride comprises  $Al_{23-1/3x}O_{27+x}N_{5-x}$ , where  $0.429 \leq x \leq 2$ .

1        23. An aluminum oxynitride made according to the method of claim 6.

1        24. The aluminum oxynitride of claim 23, wherein the aluminum oxynitride  
2        comprises  $Al_{23-1/3x}O_{27+x}N_{5-x}$ , where  $0.429 \leq x \leq 2$ .

3        25. A method of making aluminum oxynitride, the method comprising:  
4        heating a chamber;  
5        continuously introducing a reaction mixture comprising aluminum oxide and carbon  
6        into the chamber;  
7        agitating the reaction mixture within the chamber; and

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8 continuously providing the aluminum oxynitride.

1 26. The method of claim 25, further comprising:  
2 forming the aluminum oxynitride into a transparent structure.

1 27. The method of claim 26, wherein forming the aluminum oxynitride comprises:  
2 forming a green body comprising the aluminum oxynitride; and  
3 sintering the green body.

1 28. The method of claim 27, wherein forming the aluminum oxynitride comprises:  
2 isostatically pressing the sintered green body under heat.

1 29. The method of claim 25, wherein the aluminum oxynitride comprises  $Al_{23}$ .  
2  $_{13}O_{27+x}N_{5-x}$ , where  $0.429 \leq x \leq 2$ .

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